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[From the Proceedings of the California Academy of Sciences, July 1st, 1872.]

ON THE

ECONOMIC VALUE OF CERTAIN AUSTRALIAN FOREST TREES, AND THEIR CULTIVATION IN CALIFORNIA.

BY ROBERT E. C. STEARNS.

Australian forest trees propagated from the seed, with perhaps a few exceptions, thrive remarkably in California; the climate and soil appear to be nearly or quite as favorable to the growth of these exotic as of the native forest forms.

In many of the principal towns in this State, especially in and around San Francisco, in the neighboring city of Oakland and adjoining towns on the easterly side of San Francisco bay, fine specimens of many of the Australian forest species are exceedingly numerous. The most popular of these belonging to the genera *Acacia* and *Eucalyptus*, have been planted for ornamental and shade purposes; the light feathery fern-like foliage of some of the Acacias, their gracefulness, beauty and color combined with rapid growth, present so many advantages as to fairly entitle them to popular esteem. Of the Acacias recommended by Dr. Mueller on account of their economic value,* I am not aware of any being cultivated in this State for that object. *A. decurrens* (= A. mollissima) also *A. lophantha* and some other species, are frequent, and highly prized for ornamental purposes: from twenty to thirty species are enumerated in the catalogues of the principal nurseries.

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* A. decurrens, *Willd*, also A. homalophylla, *Cunn*, and A. melanoxylon, R. Br.

The many valuable properties of the species mentioned in the footnote, combined with rapidity of growth, would warrant cultivation on an extensive scale, which if judiciously conducted would be highly advantageous to the State and yield a handsome return upon the capital invested. Mueller says that the wood of A. DECURRENS, popularly known as the "Black Wattle or Silver Wattle," can be used for staves, but its chief use would be to afford the first shelter, in treeless localities, for raising forests. Its bark rich in tannin, and its gum not dissimilar to Gum Arabic, render this tree also important.

A. HOMALOPHYLLA, has a "dark brown wood, is much sought for turner's work on account of its solidity and fragrance; perhaps its most extensive use is in the manufacture of tobacco pipes."

A. MELANOXYLON "is most valuable for furniture, railway carriages, boat building, casks, billiard tables, pianofortes (for soundboards and actions) and numerous other purposes. The fine-grained wood is cut into veneers. It takes a fine polish and is considered equal to the best walnut." Under favorable circumstances it attains "a hight of 80 feet with a stem several feet in diameter." This species requires a deeper and moister soil than *A. decurrens* and *A. lophantha*, which are especially recommended for their ability to resist drought, and therefore particularly applicable to treeless and sterile areas in the southern part of California, and the adjoining country, where the temperature does not decline below 10 degrees.

The peculiar yellow displayed in the China silks and other articles, is obtained from the yellow flowers of a species of Acacia, and is of an exceeding permanent character.

The Acacias are easily propagated from seed, as I have (with some species) practically tested; and it is not unlikely that the flowers of most of the species, which are yellow, might be equally as valuable for the dyer, as the variety cultivated or used by the Chinese.

Of the Eucalypti, E. GLOBULUS is very common in California, and easily cultivated; it is the Blue Gum of Victoria and Tasmania. "This tree is of extremely rapid growth and attains a height of 400 feet, furnishing a first-class wood; shipbuilders get keels of this timber 120 feet long; besides this they use it extensively for planking and many other parts of the ship, and it is considered to be generally superior to American Rock Elm. A test of strength has been made between some Blue Gum, English Oak and Indian Teak. The Blue Gum carried 14 lbs. weight more than the Oak, and 17 lbs. 4 ozs. more than Teak, upon the square inch. Blue Gum wood, besides for ship building, is very extensively used by carpenters for all kinds of out-door work, also for fence rails, railway sleepers—lasting about 9 years—for shafts and spokes of drays, and a variety of other purposes." *

Of the rapid growth of this species of Eucalyptus and the facility with which it is propagated, most people in California who have had any experience with it are familiar; but as perhaps few persons who have specimens of it growing upon their grounds or in their yards are aware of its value otherwise than for ornamental purposes, I have deemed it a matter of interest as well as of importance to quote from Dr. Mueller's valuable paper. Having propagated the Blue Gum from the seed and raised many specimens under not particularly favorable circumstances, I can indorse the remarks of the author from whom I have quoted. An instance of rapid growth immediately under my observation, is that of a specimen purchased by me of a nurseryman, which at the time of planting (Jan. 5, 1871) measured from the ground level to the extreme tip six and one half feet, and in about eleven months (Dec. 8, 1871) had reached a height of a trifle over fifteen feet; the diameter of the stalk when set out was half an inch, and at the final measurement one and three quarters inches. I am prepared to hear of instances far exceeding my figures, but it should be borne in mind that we had very little rain after this tree was planted, and furthermore that the locality was upon nearly the highest ground in Petaluma. This tree was occasionally, but only moderately watered during a part of the time. Other trees of this species planted at the same time, also made a remarkable growth; specimens raised by me from the seed, whose growth I have noted, show a gain of ten and a half inches in twenty-one days, or half an inch per diem.

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*Vide "The Principal Timber Trees readily eligible for Victorian Industrial Culture, etc., etc., by Ferd Von Mueller."

The development of the lateral branches is as surprising as its perpendicular growth.

George C. Potter, Esq., of Oakland, informs me that specimens upon his grounds nine years old, show a diameter of twelve inches.

Of the large plantation of Eucalyptus of the Blue and Red species made a few years ago by Mr. J. T. Stratton,* of Alameda, I hear indirectly that the trees have done well. I hope at a future meeting to be able to learn from Mr. Stratton, and inform the Academy more definitely of the success thus far, and prospects of this highly commendable and important enterprise.†

The many valuable properties of the Eucalyptus attracted the attention of the French Government several years ago. A specimen in the Jardin d'Acclimation at Algiers, excited the admiration of the Emperor while on a visit to that place, and upon measuring the tree it was found, according to the Paris *Moniteur*, to have made "a height of 30 feet and a diameter of six inches in two years." Since that time it has been extensively cultivated in Algiers, and of late it has been stated that it "is making rapid progress in the south of France, Spain and Corsica, especially on account of its alleged virtues as a remedy for fever. It furnishes a peculiar extractive matter, or alkaloid, called Eucalyptine, said by some to be as excellent a remedy against fever as quinine.

In Spain its efficacy in cases of intermittent and marsh fevers has gained for it the name of "fever tree." It is a powerful tonic and diffusible stimulant, performs remarkable cures in cases of chronic catarrh and dyspepsia, is an excellent antiseptic application for wounds, and tans the skins of dead animals, giving the fragrance of Russia leather. The tree prefers a marshy soil in which it grows to a great height very rapidly. It dries the earth under it by evaporation from its leaves, and shelters it from the sun, thus preventing the generation of marsh miasm."‡

Of the medicinal properties of *E. globulus* we have additional testimony in a recent number of the Practitioner,§ where Dr. M. C.

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* Report of the Commissioner of Agriculture, 1870, p. 232.

† I do not refer to other forest plantations made in California, by Mr. Aiken or Mr. Edwards, and which I sincerely wish may be successful, for the reason that in this paper the chief object has been to call public attention to certain Australian forms.

‡ Harpers Magazine, March, 1872; Scientific Record, p. 630.

§ No. XLI, p. 268, Nov., 1871.

Maclean relates the results of his experiments on patients in the Hospital Wards at Netley, England. He says in connection with certain cases of chest aneurisms and cardiac asthma, "With the exception, perhaps of the subcutaneous injection of morphia, I know no remedy so efficacious in allaying pain, restoring dyspnœa, calming irritation, and procuring sleep in such cases, as to be compared to *E. globulus*." He also refers to the use in Germany of a tincture made of the leaf, which "has been used successfully in ʒ ij doses in the treatment of intermittent fevers." It appears that it is not only used medicinally in form of a tincture, but also that cigars are made from the leaves, and its palliative influence obtained by smoking.

"German physicians, as appears from medical journals, have found a tincture of the leaves of the *Eucalyptus globulus*, or Australian gum-tree, to be a remedy for intermittent fever. Dr. Lorimer gave it to fifty-three patients, of whom forty-three were completely cured. In five others there was a relapse, owing to a failure in the supply of the tincture. In eleven of the cases quinine had been used without effect, and ~~none~~ nine of these were cured by the *Eucalyptus*." *

Other species of the Eucalypti, of great value and well worthy of consideration, are recommended by Dr. Mueller.

E. AMYGDALINA, *Labill*, which is sometimes met with 400 feet in height; one specimen in the Dandenong ranges measured 480 feet † surpassing in altitude the gigantic Sequoias of our own State; the wood of this species is said to be well adapted for "shingles, rails, housebuilding, for the kelson and planking of ships, and other purposes;" in rapidity of growth it equals *E. globulus*, but is not so easily satisfied with any soil.

E. DIVERSICOLOR, *F. v. Mueller*, a native of S. W. Australia, sometimes reaching 400 feet in height, with a proportionate growth of stem. The timber is excellent, and young trees are reported as doing well even "in dry exposed localities in Melbourne." It is regarded by Dr. Mueller as a valuable shade tree for avenues, as it makes a dense growth.

The EUCALYPTUS CITRIODORA, *Hooker*, a native of Queensland, "combines with the ordinary qualities of many Eucalypts the advantage of yielding from its leaves a rather large supply of volatile oil of excellent lemon-like fragrance."

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* Annual Record of Science and Industry, 1871, p. 586.

† Trans. and Pro. of the Royal Society of Victoria, Part I, Vol. VIII, p. ix.

E. GOMPHOCEPHALA, *Candolle*, grows to a height of "fifty feet, wood close grained, hard and not rending."

EUCALYPTUS MARGINATA, *Smith*. "The Jarrah or mahogany tree of S. W. Australia, famed for its indestructible wood, which is attacked neither by Chelura nor Teredo nor Termites, and therefore so much sought for jetties and other structures exposed to seawater, also for underground work, and largely exported for railway sleepers. Vessels built of this timber have been enabled to do away with copper-plating. It is very strong, of a close grain and a slightly oily and resinous nature; it works well, makes a fine finish, and is by shipbuilders here considered superior to either Oak, Teak, or indeed any other wood." The tree does not grow as rapidly as the Blue Gum in the neighborhood of Melbourne, but Dr. Mueller expresses the opinion that it would make a rapid growth in a more favorable locality.

The E. ROSTRATA, *Schlecht*, the Red Gum of Victoria, is a very valuable species for the "extraordinary endurance of the wood underground, and for this reason highly valued for fence-posts, piles and railway sleepers; for the latter it will last a dozen years, and if well selected much longer. It is also extensively used by shipbuilders, for mainstem, sternpost, innerpost, deadwood, floor timbers, futtocks, transoms, knightheads, hawsepieces, cant, stern, quarter and fashion timber, bottom planks, breasthooks and riders, windlass, bowrails, etc. It should be steamed before it is worked for planking. Next to the Jarrah from W. Australia," this is the best wood for resisting the attacks of seaworms and white ants. This species reaches a hundred feet in height, which is also the height of the next and last of the Eucalypti referred to herein, viz: E. SIDEROXYLON, *Cunn.*, which produces a wood of great strength and hardness, and desirable for carpenters, shipbuilders, and wagon-makers, being suitable for wheels, treenails, belaying pins, and is considered the strongest wood in the colony; also valuable for railway sleepers, underground work in mines, etc.

The wood of the Gums is "so soft at first as to render the felling, splitting, and sawing up of the tree, when green, a very easy process, but when thoroughly dry becoming as hard as oak."*

* Baird's Dict. Nat. Hist., p. 235.

When we consider the fact of the great number of farms in California that are nearly or wholly destitute of wood, and the great and continuous expense entailed by our system of fencing, the importance to the farmer of dedicating a portion of his land to the cultivation of forest trees, from which he can obtain fuel, and fencing materials, is too palpable to admit of debate. The comparatively small expense and labor with which the cultivation of a few acres for the purposes I have named is attended, its absolute feasibility and practicability, with the beneficial results that would flow therefrom, should commend itself at once to every farmer, as a few acres of timber land for economic purposes would add much more than the cost to the cash value of a farm. The boundaries of a farm should be marked by a row or rows of trees, thus defining its limits by living monuments, and greatly adding to its beauty—from these rows as the trees advance in growth and age, some wood could be cut, and where the farm is of considerable size, enough in the way of trimmings or prunings to supply the fuel of the house. In the treeless areas of the southern part of the State, the varieties of Acacia above named would prove an important aid in assisting by their protection the planting of other species of timber; as they are easily taken care of and will stand excessive drouth. They would also be useful as is our Monterey Cypress, (*Cupressus macrocarpa*) for belts to break the force of the winds in exposed places, and it is to be hoped that before many years, timber belts for this purpose will be common wherever the coast winds prevail, as a protection to orchards and vineyards.

We have many native trees well adapted for timber or windbreaks, and while calling the attention of land owners and others to the exotic forms above mentioned and their special qualities as enumerated in Dr. Mueller's excellent paper, I do not wish to be understood as making an unfavorable comparison as against indigenous species, as for some of the purposes mentioned they will answer equally well.

It must be remembered, however, that our forests are unfortunately deficient in many of the hardwoods much used in the arts, and which we are now compelled to import from localities more favored in this respect. The aggregate amount annually sent out of the State for the purchase of this material could by proper foresight and enterprise, in a few years, be retained within our own borders, and here expended in the establishing of new industries pertaining to the very material, the manufacture of which in other portions of the Union employs large communities, to whose support we are now contributing.

As in Germany to anticipate a future need our own *Sequoia sempervirens* or Redwood tree is extensively cultivated, so here by the cultivation of the Australian Eucalypti we can in a few years supply a positive want, and reap the advantages above indicated.

Since the reading of the above paper I have had many questions asked me by persons not present at the meeting of the Academy, and as an answer to said inquiries and to various propositions I have added the following:

Some objection has been made to the Acacias and Eucalypts by persons who have planted them for shade or ornamental purposes in the neighborhood of San Francisco, for the reason as alleged that they do not withstand the winds. So far as the observations of myself and others who have investigated the matter extend, it is really surprising that so few are prostrated. The fault is not with the trees but the purchaser; as trees of from four to six feet in height are sold at a low price, they are bought by parties who require only a few, in preference to smaller trees, as they make a greater immediate show. As most of the growth of the trees as usually purchased, after having attained a height of six inches, has been made in the pot or box in which they are sold by the dealers, it will readily be perceived that the tap-root which in a natural state descends, is diverted from a perpendicular into a rotary direction, analogous to a spiral spring, and is also crossed and recrossed on itself—with the liability as it increases in size to strangle the tree by one portion of this root making a short-turn or twist upon another part of the same, or by being wound about and restricted by the lateral roots. It is therefore apparent that the better policy would be, even where only a few trees are wanted, (and this remark applies with equal pertinence to all trees) that other things being equal, such as comely shape and healthy condition, the younger and smaller trees are really cheaper at the same price than the larger, and can generally be obtained for much less. For forest culture the smaller trees are indispensable to success.

Again it is frequently the case that the lower branches are trimmed off to a mischievous extent, which also is a mistake; for where a tree has sufficient space to grow in, but little trimming is necessary, and it is a false taste which seeks to improve (?) upon nature by depriving a tree of its normal physiognomy and distinctive character by carving it into grotesque or inappropriate shapes; it is simply mutilation, and is certain to result in the premature decay and death of the victim. The flattening of the head by certain aboriginal tribes, and the distorted feet of the fashionable Chinese ladies, are further and pertinent illustrations of analogous hideous violations of natural form.

In compliance with my request to Dr. Arthur B. Stout, of this city, for a relation of his experience with the Eucalyptus in connection with his medical practice, I have received the following:

MR. STEARNS:

Dear Sir: In response to your invitation, I am happy to contribute to your important article on the culture and uses of the Eucalyptus in California, my experience of the medical properties of that valuable plant. The Eucalyptus is not less precious for its medicinal virtues than it is ornamental in arboriculture and useful in the arts. Several months ago, incited by information derived from the *Practitioner* and other sources of knowledge, I collected and dried the leaves. The agreeable empyreumatic oil of the leaves, in evaporating, diffused a balmy odor through the house. I therefore considered that as this oil, as well as the catechu gum and kino, and the cajeput oil, are all similar hydrocarbons, their qualities must resemble the creosote, pyroligneous and carbolic acids in their disinfectant and hygienic properties. I have no doubt that Eucalyptus has these properties in a milder or weaker degree, only differing in being accompanied with an agreeable perfume, wanting to creosote and carbolic acid. As a purifier therefore of the musty atmosphere and unpleasant emanations in basements and cellars, I have recommended the scattering of the dried leaves in such places. The powder of the dried leaves scattered in trunks and among clothes will no doubt be as useful and more agreeable than tobacco or camphor to prevent the growth of moths or other insects. Its chief value is, however, as a sedative and antiseptic in asthma, and throat diseases, nasal catarrhs, and affections of the mucous membranes. To utilize these properties I had a concentrated tincture with alcohol at 95° prepared by Messrs. Steele & Co., and also contrived an inhaler with which to introduce the vapor of the essential oil to the throat and lungs. I can testify to the excellent effect of this mode of medication. The paroxysms of chronic asthma are relieved and shortened, and acute attacks are quickly allayed. The inhaler is a simple instrument made of tin. It is a cup of a capacity of 4 fluid ounces; the lid, attached by a hinge, has a tube from the centre about three inches high, bent near the end at a right angle, and terminated with a mouth piece like that of a speaking trumpet. The cup is on legs so that a spirit lamp may be placed underneath, and has a wooden handle to move it about when heated. Put two ounces of boiling water, (4 tablespoonfuls) in the cup; add one tablespoonful of the tincture; and inhale the vapor, while the fluid is kept gently boiling with the spirit lamp. Again, I had prepared cigarettes with the coarsely powdered leaves. These produce a decidedly anodyne and antispasmodic effect. An agreeable syrup may also be prepared, useful in infantile maladies.

There can be little doubt but that the oil of Eucalyptus, and Eucalyptine when it can be procured, will be available remedies against malarious diseases of all types, and that the presence of the trees, cultivated in gardens, contribute to sanify the atmosphere from those emanations which give origin to epidemic diseases. That the parasitic insects which infest other plants do not relish the Eucalyptus is evident from the general cleanness of the leaves and the fact that the hydrocarbon oils are fatal to animal life. The balmy perfume, therefore, that exhales from them must have an influence in destroying the parasites which frequent shrubs growing in their vicinity, tending to diminish if not suppress them.

In corroboration of the advantages to be obtained by the cultivation of this Myrtacea, may be shown the efforts made during the last fifteen years to acclimate it in Europe and elsewhere. Ramel has succeeded admirably in introducing this tree in Provence (France), in Spain, Italy, the islands of the Mediterranean sea, and in Algeria. It appears in the botanical gardens of Germany (Munich); and in Vienna, Austria, an apothecary, Lamalsh, has raised 3,000 specimens from seeds. From these he has prepared tinctures and oils for medical purposes.

See annual report of Wiggen and Husemann of progress in Pharmacy, etc., Göttingen, 1871.

By the assiduity of Dr. Pigne-Dupuytren, this tree has been carefully cultivated in the garden of the French Hospital of the Mutual Benevolent Association. So, that institution enjoys already the benefit of the tree hygienically, and has its supply of leaves for tinctures and syrups. The leaves steeped in boiling water are also used as a ptisane or beverage.

However obnoxious to parasites in general this tree may be, it appears it nevertheless has its own species in the Psylla Eucalypti. This insect is an Hemipteron, and appears on the Eu. dumosa. It deposits a species of manna, called in Australia *Lerp* or *Laap*. It is a white substance, 53.1 per ct. of sugar syrup and 46.9 p.c. of a special modification of starch. This is prized by the inhabitants as a Manna ; and is greatly sought for by the bees, who convert it into honey. Dobson (entomology) describes it as the cup-like coverings of the Psyllidæ, but Wittstein mentions six varieties of Psylla, and that one species produces a colored Lerp handsomer than the white, but as a deposit beneath the cup like shields of the insect.

See same annual, Göttingen, 1870.

If this insect derives his Lerp from the aromatic and balmy oil of the Eucalyptus, and furnishes an agreeable aliment for the inhabitants, and a Mt. Hymettus-like honey stuff for the bees, certainly the busy little insect manufacturer, parasite as he is, may be freely pardoned. Very respectfully yours,

A. B. Stout, M. D.

From experiments recently made upon myself, I find that small doses, ℥ ij to ʒ iij, of the infusion of the leaves (of young trees) drank when cold, quiet the nerves and induce sleep ; quite likely, in ordinary cases of wakefulness, a pillow stuffed with the leaves would produce the same result. My friend, Dr. Kellogg, has prescribed the infusion in dyspepsia, and reports favorably. In addition to the many valuable properties of the Blue Gum herein recited, I have no doubt but camphor in considerable quantity can be obtained from it.